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Title: THE PHYLOGENY OF THE CILIATES (CILIOPHORA: LITOSTOMATEA) ASSOCIATED WITH MACROPODID MARSUPIALS.

ABSTRACT: Macropodid marsupials (kangaroos and wallabies) have endosymbiotic ciliates inhabiting their stomachs. Our investigations of 282 animals representing 23 host species have found over 50 ciliate species belonging to 6 genera. It is unknown whether this ciliate fauna had a Gondwanan origin in association with primitive marsupials or whether some or all had an Asian origin and entered Australia in the Miocene with rodents. Small subunit ribosomal DNA of representative species from each Australian genus was sequenced and their phylogenetic relationships to other ciliates inferred with parsimony and maximum likelihood analysis. The Australian genera form a monophyletic assemblage whose sister group is the Trichostomatina, endosymbionts of placental herbivores. The branching pattern indicates a deep, well supported branch (90+ bootstrap values) separating the two groups. On this basis we have concluded that the Australian endosymbiotic ciliate fauna is of monophyletic Gondwanan origin. The two groups of endosymbiotic ciliates within herbivorous mammals (placental and marsupial) share a common ancestor but extant assemblages are the result of independent parallel radiations within different herbivorous mammalian groups.